11-1990

Conservation Tillage: Cultivators for No-till and Ridge-till

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Cultivators for No-till and Ridge-till

Although no-till implies "no tillage," many producers using high residue cropping systems allow themselves the flexibility of row crop cultivation. The protective surface residue is disturbed only when the plant canopy is rapidly beginning to protect the area between rows. Weed escapes can be controlled with timely cultivation.

When changing equipment, producers with highly erodible land should strongly consider a cultivator capable of handling high amounts of residue. Ridge-till producers usually cultivate twice, once early and once to reform ridges. Many no-till producers cultivate only as needed but appreciate having the option for additional cultivation.

Ridge-till systems require mechanical cultivation. Banding pesticides limits chemical costs and helps environmental quality, but makes timely, effective cultivation more critical.

No-till Equipment

Uniform, adequate, but shallow penetration is desired as in any cultivation. Conventional cultivators usually handle chopped soybean stubble. Residue clearance is essential. To avoid plugging, many units use heavy frames with a single wide sweep between rows. Sweep width varies from 16 to 24 inches, depending on row width. The large, heavy frame handles increased stress from large single sweeps and aids in soil penetration. Internal concrete or water adds weight to some frames.

Cultivation depth usually is adjusted by either a gauge wheel or depth band on a leading straight coulter used to cut residue ahead of the sweep.

Variations for cultivation other than the single wide sweep include a horizontal free wheeling disk and the rotating cultivator. Rotating cultivators use gangs of three to five rotary hoe-type spider wheels. The spiders curve in the opposite direction to those used on conventional rotary hoes and run at an angle to the row.

Ridge-till Equipment

In addition to handling high amounts of residue, the ridge cultivator must be capable of throwing soil up into a ridge. Adjustable ridging wings or disk hillers often are used for this purpose.

The amount of soil being thrown as well as its speed and angular direction from the line of travel affect ridge height. Deeper, faster cultivation with ridging wings or disk hillers angled outward from the line of travel all contribute to more soil being thrown into the ridge area. Maximum final ridge height is limited by the maximum angle at which the soil will rest (angle of repose) and row width.

Shields (such as sheet metal, disks, or spider wheels) are used during the first cultivation. Deeper cultivation during the first pass helps supply loose soil for later ridge building. Cutaway disks run ahead of the sweeps, right next to the row. They should be set to move soil away from the rows the first time over, then reversed to ridge during the final cultivation. Avoid throwing soil that covers lower soybean pods.

Some sweep configurations limit the tendency of the soil to slab during ridging by using a protruding point or angle iron baffle. Large, straight coulters (18 to 27 inches) are useful for keeping squarely on the ridges.

An alternative for some producers to purchasing a new cultivator (about $1,500 per row) is modification of an existing unit by removing shanks, replacing existing sweeps with wide sweeps, and adding weight. "S" shank or Danish tine cultivators generally are not strong enough for conversion.

Management Tips

Management begins during harvest by evenly spreading combine residue. Chopping stalks may reduce plugging problems the next season. Timely use of a rotary hoe aids in effective mechanical weed control. If residue plugs the hoe, try pulling the spider wheels backwards, if possible.

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EXTENSION
Ames, Iowa 50011
AE-3055 | November 1990

As in any cultivation, the objective is to avoid root pruning and covering the crop, yet provide good weed control. Small weeds in the row should be covered if crop height allows. However, shallow cultivation, 1 to 2 inches deep, avoids uncovering more weed seeds that will germinate.

Active and passive guidance systems are available to help reduce operator fatigue and allow operating closer to the rows. Passive systems costing $500 to $800 use a dashboard indicator to signal the operator for manual steering control. Active systems to automatically control the steering can cost $3,000 or more.

Uniform, shallow cultivation requires proper positioning of sharp, rust-free sweeps. Row clearance and sweep angle are critical. Find all row locations from the center point, then adjust for clearance from the row center.

Systematic adjustment on a level concrete surface with boards under depth wheels to set tool depth is desirable for best results. To accurately gauge sweep depth, use boards that are slightly thinner than the operating depth under the depth wheels. The slightly thinner boards allow for soil compaction and dynamic action of the sweeps.

Check the operator's manual for sweep angle. Too steep an angle increases point wear and draft. Too flat an angle increases wing wear and floats the sweep out of the ground.

Tractor hydraulics should be in good condition. Routinely inspect shovel and frame wear points. Lower equipment when not in use and use mechanical lockout safety stands unless the cultivator is firmly attached to the tractor.

Because of its width, a cultivator needs to be clearly marked for transport. Red reflectors are suggested for extreme left and right rear corners as well as an amber reflector on the extreme left front corner. The SMV sign should be clearly visible. Beware of overhead power lines with folding wing equipment.

For more information on conservation tillage systems, see the following publications:

AE-3049 *Conservation Tillage—Planning*
AE-3050 *Conservation Tillage—Effects on Soil Erosion*
AE-3051 *Conservation Tillage—Effects on Water Quality*
AE-3052 *Conservation Tillage—No-till Systems*
AE-3053 *Conservation Tillage—Ridge-till Systems*
AE-3054 *Conservation Tillage—Fertility Practices and Equipment for No-till and Ridge-till*
AE-3055 *Conservation Tillage—Cultivators for No-till and Ridge-till*
AE-3056 *Conservation Tillage—Planters for No-till*
AE-3057 *Conservation Tillage—Planters for Ridge-till*

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Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Robert M. Anderson, Jr., director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.